

I CLAIM:

- 1 1. A targeted complex of the formula:
2 {{(delivery vehicle-CM) – TMI – (CM-targeting ligand)}};
3 wherein CM is a chelating moiety, TMI is a transition metal ion, and
4 CM-targeting ligand is a chelating moiety (CM) covalently linked to a targeting ligand.

- 1 2. The complex of claim 1, wherein the delivery vehicle is a virus and the
2 chelating moiety is a chelating peptide.

- 1 3. The complex of claim 2, wherein the virus lacks a native viral ligand
2 that binds to a native cellular receptor for the virus.

- 1 4. The complex of claim 2, wherein the virus is replication competent.

- 1 5. The complex of claim 2, wherein the virus is replication deficient.

- 1 6. The complex of claim 2, wherein the virus includes a polynucleotide
2 that encodes a p53 tumor suppressor polypeptide and the targeting ligand is a antibody that
3 binds to a tumor antigen.

- 1 7. The complex of claim 2, wherein the virus is an adenovirus.

- 1 8. The complex of claim 7, wherein the viral coat protein is selected from
2 a fiber, a penton and a hexon.

- 1 9. The complex of claim 7, wherein the adenovirus is replication
2 competent.

- 1 10. The complex of claim 9, wherein the adenovirus is a wild-type
2 adenovirus.

1 11. The complex of claim 9, wherein the adenovirus is a selectively
2 replicating adenovirus.

1 12. The complex of claim 7, wherein the adenovirus is replication deficient.

1 13. The complex of claim 12, wherein the genome of the adenovirus
2 comprises a partial or total deletion of the adenoviral E1 region.

1 14. The complex of claim 12, wherein the genome of the adenovirus
2 comprises a partial or total deletion of the protein IX-encoding region.

1 15. The complex of claim 2, wherein the virus is selected from the group
2 consisting of a retrovirus, a vaccinia virus, a herpes virus, an adeno-associated virus, a
3 minute virus of mice (MVM), a human immunodeficiency virus, a sindbis virus, an
4 MoMLV, and a hepatitis virus.

1 16. The complex of claim 1, wherein the delivery vehicle is selected from
2 the group consisting of a bacteriophage, a peptide vector, a peptide-DNA aggregate, a
3 liposome, a gas-filled microsome, and an encapsulated macromolecule.

1 17. The complex of claim 1, wherein the targeting ligand is an antibody.

1 18. The complex of claim 17, wherein the antibody is reactive with a tumor
2 antigen.

1 19. The complex of claim 17, wherein the antibody is selected from the
2 group consisting of Fab, Fab', Fab₂' and Fv fragments.

1 20. The complex of claim 17, wherein the antibody is a human antibody.

1 21. The complex of claim 17, wherein the antibody is a single chain
2 antibody.

1 22. The complex of claim 21, wherein the single chain antibody is reactive
2 with carcinoembryonic antigen.

1 23. The complex of claim 1, wherein the targeting ligand comprises a
2 conformationally constrained peptide.

1 24. The complex of claim 23, wherein the conformationally constrained
2 peptide comprises a portion of an adenoviral fiber protein.

1 25. The complex of claim 1, wherein the CM is a chelating peptide or an
2 organic chelating agent.

1 26. The complex of claim 25, wherein the organic chelating agent is
2 selected from the group consisting of a bidentate, a tridentate, a quadridentate ligand and a
3 tripod ligand.

1 27. The complex of claim 26, wherein the organic chelating agent is
2 selected from the group consisting of iminodiacetic acid, nitrilotriacetic acid, terpyridine,
3 bipyridine, triethylenetetraamine, and biethylenetriamine.

1 28. The complex of claim 1, wherein the delivery vehicle is a liposome.

1 29. The complex of claim 1, wherein the delivery vehicle is a
2 paramyxovirus.

1 30. A viral vector complex that comprises a targeting ligand that is attached
2 to a surface polypeptide of a viral vector by a coordinate covalent linkage mediated by a
3 transition metal ion.

1 31. A method of producing a kinetically inert targeted delivery vehicle
2 complex, the method comprising:

3 a) preparing a kinetically labile transition metal complex by contacting
4 a delivery vehicle-CM and a CM-targeting ligand with a transition metal ion that is in a
5 kinetically labile oxidation state; and
6 b) changing the oxidation state of the metal ion to form the kinetically
7 inert complex.

1 32. The method of claim 31, wherein the kinetically labile transition metal
2 complex is prepared by:

3 a) contacting the CM-targeting ligand with the transition metal ion in a
4 reaction vessel and allowing the transition metal ion to bind to the CM to form a transition
5 metal ion-CM-targeting ligand complex;
6 b) removing uncomplexed transition metal ion from the reaction vessel;
7 and
8 c) contacting the transition metal ion-CM-targeting ligand complex
9 with the delivery vehicle-CM and allowing the transition metal ion to bind to the CM to
10 form the complex.

1 33. The method of claim 31, wherein the kinetically labile transition metal
2 complex is prepared by contacting the CM-targeting ligand and the delivery vehicle-CM
3 with the transition metal ion simultaneously.

1 34. A method of delivering a therapeutic or diagnostic agent to a target cell
2 in an organism, the method comprising administering to an organism a targeted complex of
3 the formula:

4 $\{(\text{delivery vehicle-CM}) - \text{TMI} - (\text{CM-targeting ligand})\};$
5 wherein delivery vehicle-CM is a delivery vehicle that displays on its
6 surface a polypeptide that comprises a chelating moiety (CM), TMI is a transition metal ion,
7 and CM-targeting ligand is a chelating moiety (CM) covalently linked to a targeting ligand
8 that binds to the target cell.

1 35. The method of claim 34, wherein the delivery vehicle is a viral vector
2 and the chelating moiety is a chelating peptide (CP).

1 36. The viral vector of claim 35, wherein the viral vector is selected from
2 the group consisting of an adenovirus, a retrovirus, a vaccinia virus, a herpes virus, an
3 adeno-associated virus, a minute virus of mice (MVM), a human immunodeficiency virus, a
4 sindbis virus, an MoMLV, and a hepatitis virus.

1 37. The viral vector of claim 35, wherein the viral vector is an adenoviral
2 vector and the surface polypeptide is a viral coat protein selected from the group consisting
3 of a penton base, a hexon polypeptide, and a fiber polypeptide.

1 38. The method of claim 34, wherein the therapeutic agent is a gene that
2 encodes a therapeutic polypeptide.

1 39. The method of claim 38, wherein the gene encodes a polypeptide
2 selected from the group consisting of a tumor suppressor, an antigenic polypeptide, a
3 cytotoxic polypeptide, a cytostatic polypeptide, a cytokine, a chemokine, a pharmaceutical
4 protein, a proapoptotic polypeptide, a prodrug-activating polypeptide, an angiogenesis-
5 inducing polypeptide, and an anti-angiogenic polypeptide.